Courseware Solutions Inc.

www.mathville.com

MATHVILLE STARWAY

Mathville™ Starway User Manual

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Getting started

Insert the CD-ROM into the CD-ROM drive.

Windows 3.x

a) Using the File Manager, click the CD-ROM drive icon.

b) Double-click **star3.exe** to start.

Windows 95 or higher

a) Choose My Computer.

b) Choose the CD-ROM drive icon.

c) Double-click the **Starway** icon to start.

Macintosh

a) Double-click the **Starway CD** icon to show the contents of the CD-ROM.

b) Double-click the **Starway - Power Mac** or **Starway - Mac** icon to start.

Electronic user manual

a) Follow the instructions for starting the program, but double-click **Manual** to view the electronic version of the user manual.

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Overview

Mathville Starway is part of the **Mathville™** series of educational software, which is based upon the belief that EVERY student can enjoy developing and demonstrating their mathematical literacy within a supportive, mathematically rich environment.

The **Mathville** series is used in thousands of schools and is recommended by many departments and boards of education. The programs are designed in accordance with the standards developed by the National Council of Teachers of Mathematics and adhere to the curriculum guidelines of many North American school systems.

Structure & content

Starway is a challenging space-themed environment where students can discover a wide variety of highly motivating math activities. It is a non-linear, non-hierarchical program, and students are free to start or leave any of the activities at any time. The ten activities are:

Celestimation - beat the clock with your visual estimating skills

Fraction Balance - balance cargos of equivalent fractions

Graphmaker - create bar, line & circle graphs from your own or given data

Integer Prize - guide your rocket to hit or miss positive and negative UFO's

Metriconversion - remember & match hidden metric measures and prefixes

Quadrant Quest - explore the first quadrant searching for unknown stars

Rocket Factors - launch factors, multiples, composites or primes

Rocket Rotation - angle your rocket to collect polygons and solids

Space Shapes - guide and categorize falling angles and polygons

Star Survey - create models of very large and small planetary data

The specific math and problem-solving skills required by each activity are listed in the table on pages 4 and 5. More detailed descriptions of the activities and their educational objectives begin on page 8.

Suggested grade range

The topics in **Starway** are often introduced in grade 6 classrooms. Due to its structure, which allows students to freely explore a wide variety of activities and math skills, the program may be used in grades 5 to 7 and may be enjoyed by older students as well.

Recommendations for use

Mathville Starway is a teaching resource designed to supplement and reinforce initial classroom instruction. The program may be used independently by students and does not require close supervision. Most students readily begin exploring **Starway** on their own and enjoy playing for a full class period.

Careful observation of a student's interactions with the program can reveal a great deal to the teacher about a student's problem-solving abilities, understanding of concepts and ability to apply skills in new situations.

Starway may be used as:

- a highly motivating way to reinforce and provide additional practice in math skills introduced in class
- a means of providing a wider variety of applications of math skills and concepts
- a source of assessment information about a student's problem-solving methods and styles and a diagnostic tool to determine areas of difficulty
- an enrichment activity for students who excel in math

Encouraging students to introduce others to the program and to discuss their results and strategies creates opportunities for the development of communication skills and co-operative problem solving.

Tracking student progress

Each **Starway** activity includes an optional printable record of achievement which includes a list of the learning outcomes associated with each activity. These certificates provide a "paper track" of individual student progress and are also excellent additions to a student's math portfolio. Records of achievement printed out over time can be used to measure improvement and provide evidence of skills mastery.

Electronic manual

An electronic version of this manual is included on the CD-ROM for reference and as a backup. It may be printed in whole or in part. To use the electronic version, double-click the **Manual** icon.

Updates and additional materials

Software updates and supplementary materials, such as the worksheet in the Appendix, are available as free downloads from **www.mathville.com**.

System Requirements

Starway is a dual-platform multimedia CD-ROM program that runs on a Windows PC or a Macintosh with the following minimum requirements:

Multimedia PC

- 486 or Pentium
- 8 MB RAM
- Windows 3.x or 95 or higher
- SVGA 640 x 480, 256-color monitor
- CD-ROM drive
- Sound card
- Printer recommended

Macintosh

- System 7
- 8 MB RAM
- 640 x 480 color monitor
- CD-ROM drive
- Printer recommended

Copying to a hard drive

Starway was developed to run directly from the CD-ROM. However, if you wish to copy it to a hard drive and run it, the following files and folders, which require about 12 MB, should be copied:

Windows 95 or higher

- **Starway.exe**
- DATA folder

Windows 3.x

- **Star3.exe**
- DATA folder/directory

Macintosh

- **Starway - Power Mac** or **Starway - Mac**
- DATA folder

Curriculum Connections

Number Sense & Numeration

Composite numbers	*Rocket Factors*
Decimals	*Star Survey*
Factors	*Rocket Factors*
Fractions (equivalence)	*Fraction Balance*
Fractions & decimals	*Star Survey*
Fractions & percent	*Celestimation*
Fractions on a number line	*Star Survey* *Celestimation*
Integers	*Integer Prize*
Multiples	*Rocket Factors*
Number lines	*Star Survey* *Integer Prize* *Celestimation*
Numbers from 0.001 to 1 000 000 000	*Star Survey*
Ordering whole numbers, decimals & fractions	*Star Survey*
Percent (concept)	*Graphmaker* *Quadrant Quest*
Percent (estimation)	*Celestimation*
Prime numbers	*Rocket Factors*
Ratios	*Rocket Rotation*

Geometry & Spatial Sense

Angles (acute, obtuse, right)	*Space Shapes*
Coordinates (first quadrant)	*Quadrant Quest*
Lines of symmetry	*Rocket Rotation*

Nets of polyhedra . . . . . *Rocket Rotation*

Quadrilaterals (parallelogram, rhombus, trapezoid) . . . . . *Space Shapes*

Rotations . . . . . *Rocket Rotation*

Triangles (side & angle properties) . . . . . *Space Shapes*

Measurement

Angles (estimation) . . . . . *Rocket Rotation*

Metric conversions . . . . . *Metriconversion*

Metric prefixes . . . . . *Metriconversion*

Patterns & Relations

Equality . . . . . *Fraction Balance*

Graph patterns . . . . . *Graphmaker*

Identifying and extending patterns . . . . . *Quadrant Quest*

Data Management & Probability

Bar graphs . . . . . *Graphmaker*

Circle graphs . . . . . *Graphmaker*

Computer applications & data graphs . . . . . *Graphmaker*

Data display (choosing appropriate graphs) . . . . . *Graphmaker*

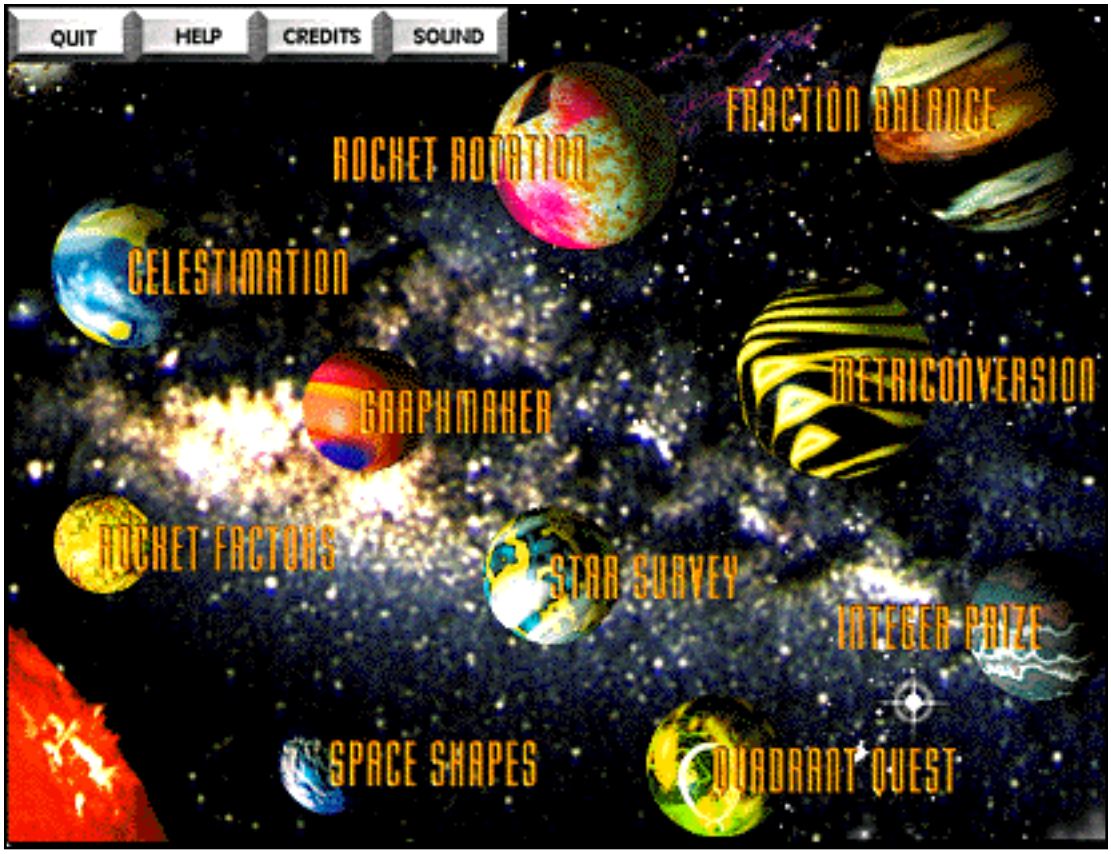
Line graphs . . . . . *Graphmaker*

Organizing data for graphs . . . . . *Graphmaker*

Problem Solving

Throughout the program, but especially in *Fraction Balance* and *Quadrant Quest*

Quick Tour



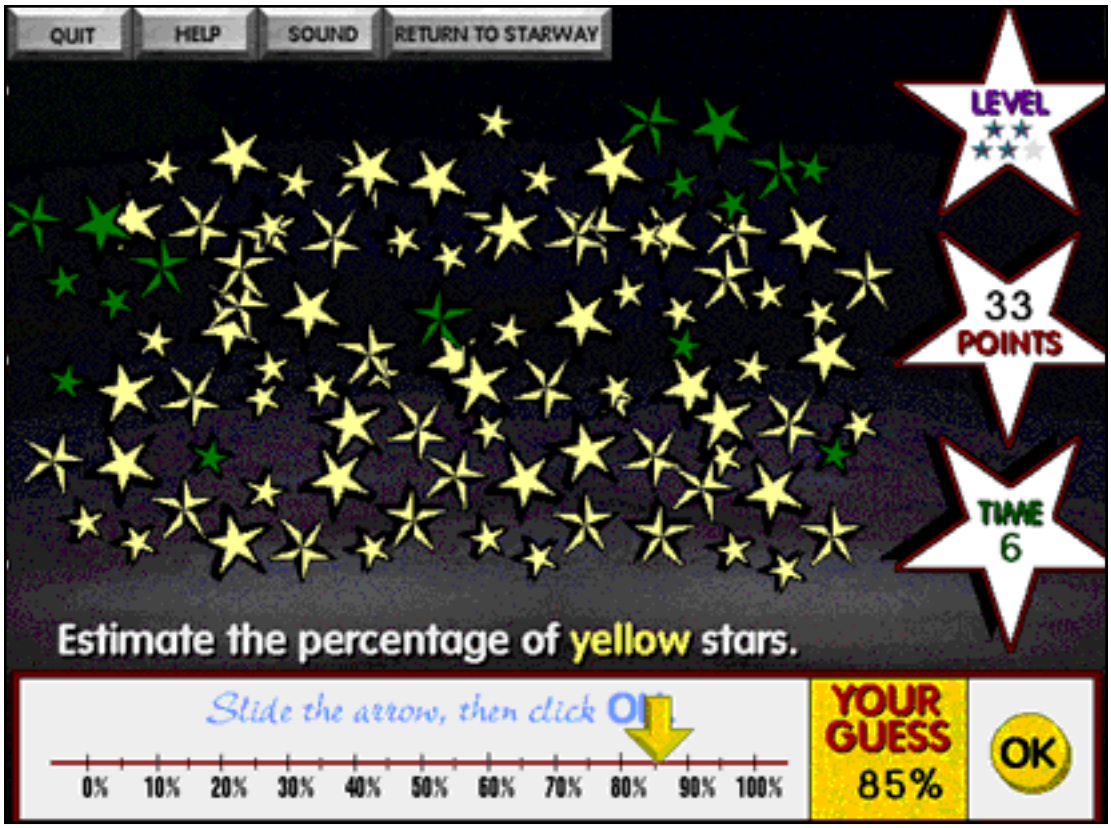
- To select a **Starway** activity, click one of the planets. For example, to choose *Space Shapes*, click on the *Space Shape*s planet.
- To return to this main screen, click the **Back to Starway** button in each activity.
- Many of the activities have several levels of progressively more difficult or varied problems. The activities have been designed so that a student who has mastered the skills associated with the activity can advance through an entire set of levels or problems quickly and accurately. The number of problems done correctly during this progression from Level 1 to the top level provides solid evidence of mastery of the skills associated with the activity.
- The four rectangular buttons in the upper left corner of the screen are:
    - **QUIT** – to exit from the program **Starway**
    - **HELP** – to see context-sensitive help

      In the activities, this is often in the form of a definition, example or math content-related assistance.

    - **CREDITS** – to see a list of the creators of **Starway** along with telephone, fax and e-mail information
    - **SOUND** – to display the slider control that adjusts the sound volume. Click in the upper corner to close the display.
- Starting the program is a straightforward process that most computer-literate students could handle on their own, perhaps following a teacher demonstration or the posted "Getting started" instructions (see the first page of this manual). Since the program runs straight from the CD-ROM, there is no danger of causing accidental damage to the program or any other program on the computer.
- When done with the program click **QUIT** and eject the CD-ROM. There is no need to "uninstall" since nothing is ever put on the hard drive.
- Students generally discover a lot about **Starway** by following their natural inclinations to explore. Encourage students to answer their own "What do I do next?" or "How do I…"-type questions by using the **HELP** button or looking at the screen and experimenting.
- Having pairs of students work together on the program works well, providing a setting for cooperative problem-solving. One way of doing this is to set up a computer running **Starway** in a resource or math lab area.
- Asking students to explain and compare the strategies they used for activities such as *Fraction Balance* or *Quadrant Quest* provides an opportunity to assess both communication and problem-solving skills.
- If a printer is available, you may wish to ask students to click the **PRINT** button that appears when each activity is completed and to save the printouts as a way of tracking their achievements in the program.

Sample screens, a more detailed list of the math skills addressed in each activity and descriptions of the activities begin on the next page.

Celestimation



Math skills

- ★ Estimate fractions
- ★ Estimate percent
- ★ Fractions and percent on a number line
- ★ Relate fractions to percent

Description

You have 20 seconds to estimate (not count, there's not enough time) the fraction or percent of a given type of star in the sky. Slide an arrow along a number line marked with fractions or percents to answer. "Too high/Too low" hints will help.

If time runs out before you make a good estimate, you'll see another problem at the same level of difficulty. Click HELP for a suggested method. Once you make a good estimate, you'll move up to a more difficult estimation task.

Win a round by making good estimates in 5 progressively more difficult situations: estimating to the nearest quarter, first for a field of 100 stars and then for varying numbers; to the nearest tenth; and to the nearest 5% on a number line marked with 10% intervals, first for a field of 100 stars and then for varying numbers.

Fraction Balance

Math skills

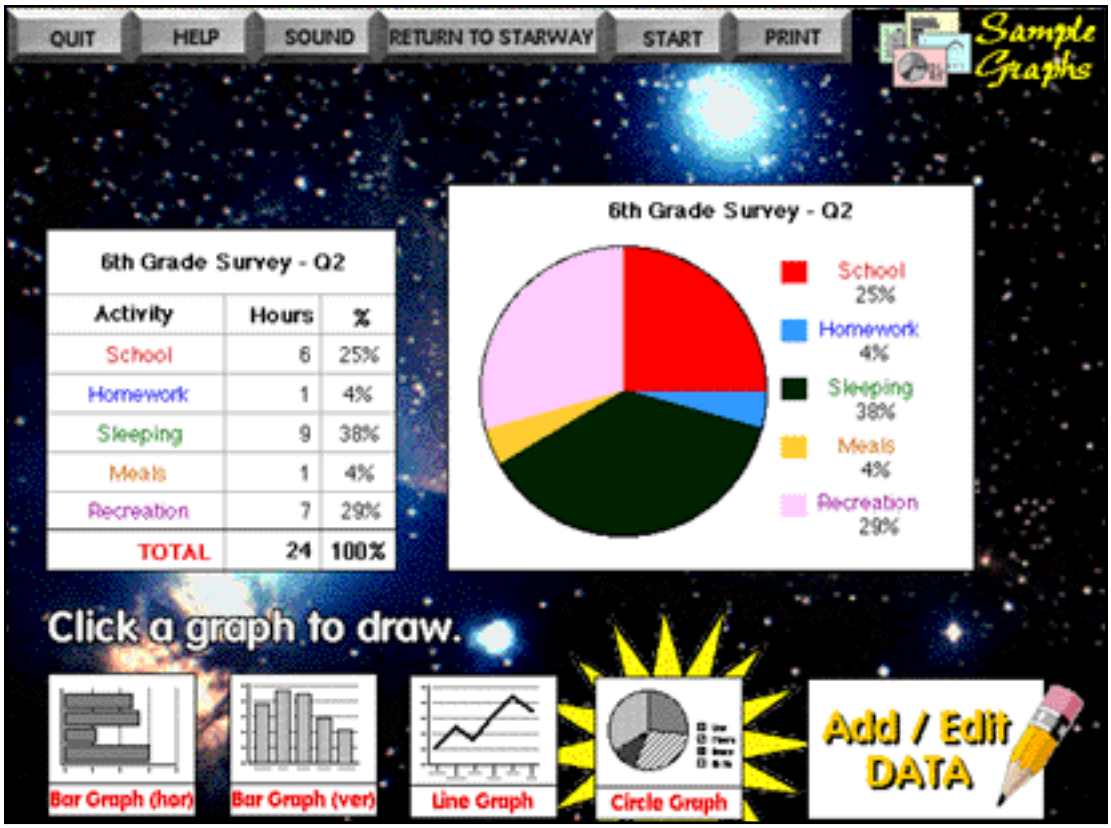
- ★ Demonstrate an understanding of equivalent fractions and mixed fractions using concrete materials
- ★ Demonstrate the meaning and preservation of equality by balancing objects

Description

Balance your cargo by dragging the fraction pieces onto either the left or right cargo dock. Watch the ship tilt as a result of your moves. Cargo pieces can be moved off and onto the cargo docks as often as required in order to achieve the perfect balance.

All cargo pieces must be on the docks and balanced before moving on to the next level. Each level (there are five in total) gets progressively more difficult and will put your fractions and problem solving skills to the test.

Graphmaker



Math skills

- ★ Experiment with a variety of displays of the same data using computer applications and select the type of graph that best represents the data
- ★ Look at how the choice of intervals affects the appearance of data
- ★ Recognize that different types of graphs can present the same data differently
- ★ Construct line graphs, bar graphs and circle graphs using a computer
- ★ Demonstrate an understanding of percent in circle graphs

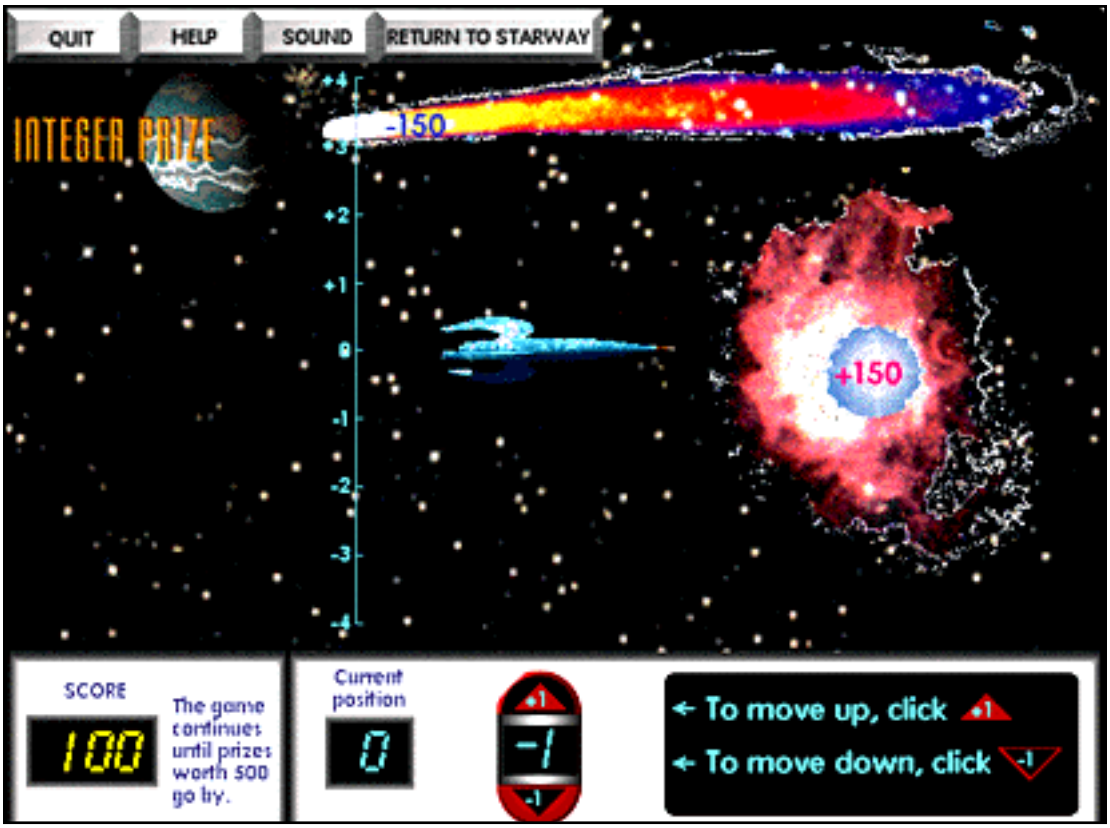
Description

Use this activity as a graphing tool to quickly illustrate how different graphs look when representing the same set of data, or examine the existing sample graphs if your own data is not readily available.

To enter your own data, select Add/Edit DATA, enter your data, labels and titles according to the guidelines presented (Rules for Data Entry), select a graph to draw and then repeat the cycle as often as you like.

Some of the sample data graphs provided by the program are also editable by selecting Add/Edit DATA (See picture above).

Integer Prize



Math skills

- ★ Demonstrate an understanding of integers
- ★ Represent integers on a number line

Description

Maneuver your rocket ship to intercept or avoid objects labeled with positive or negative values that randomly appear. Click the triangular +1 or -1 buttons to change your ship's position, which can vary from -4 to +4 on the number line.

Each time your ship touches an object, its value is added to your score, so intercepting positive objects increases your score and failing to avoid negative objects decreases it. As you become more skillful and start piling up the points, the action will become faster.

Win a round when your score reaches +500. At the end of the round your maneuvering skill is reflected in a percent score.

Metriconversion

Math skills

★ Use prefixes in the metric system correctly
★ Make simple conversions between metric units

Description

Play a game of Concentration: click two hexagons and if a metric prefix and its corresponding number meaning are on the flip sides, you've made a match and the two hexagons fly away. For example, *deca* would match *10*. Win a round by matching all the metric prefixes with their meanings and clearing the board.

There are two versions of the game: the 18-hexagon version pictured above with prefixes and numbers and a 16-parallelogram version with equivalent metric measures such as *100 cm* and *1 m*. The first version given is randomly selected and if you elect to play additional games, the versions alternate.

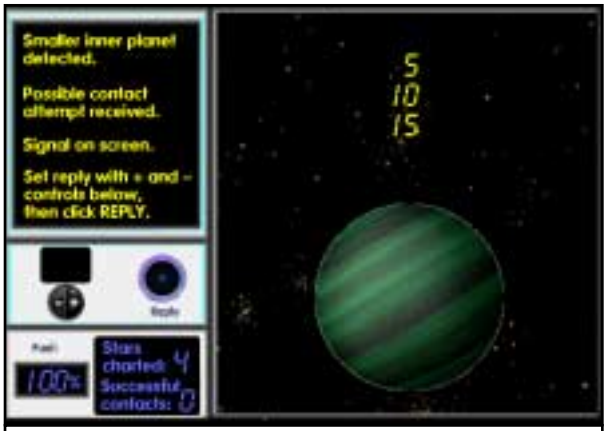
The measures, numbers or prefixes are randomly selected each time you play, and they are randomly positioned, as well, so that each time you play you see a different game.

Quadrant Quest

Your mission is to explore a 40x40 section of the first quadrant, seeking out 9 randomly-placed stars and contacting any inhabited planets. To explore, click the round -/+ buttons to set x, y coordinates and then click *JUMP*.

After each jump, a scan shows the x and y directions to the nearest star and its estimated distance. In this example, your next jump should be to a larger x and a smaller y. It should also be about 3 units from your (5, 5) position.

Each jump uses 5% of a full tank of fuel. When you find a star with a gas giant planet, use *Sample source & analyze* to find out whether it's safe to refuel.



If you scan for planets before leaving a star system, there may be a contact attempt. Extending the pattern being sent will complete a successful contact.

Math skills

- ★ Demonstrate an understanding of coordinates in a Cartesian plane in the first quadrant and plot points
- ★ Identify and extend patterns
- ★ Demonstrate an understanding of percent

Description (see above)

Rocket Factors

Math skills

★ Identify the characteristics of multiples and factors and composite and prime numbers to 100

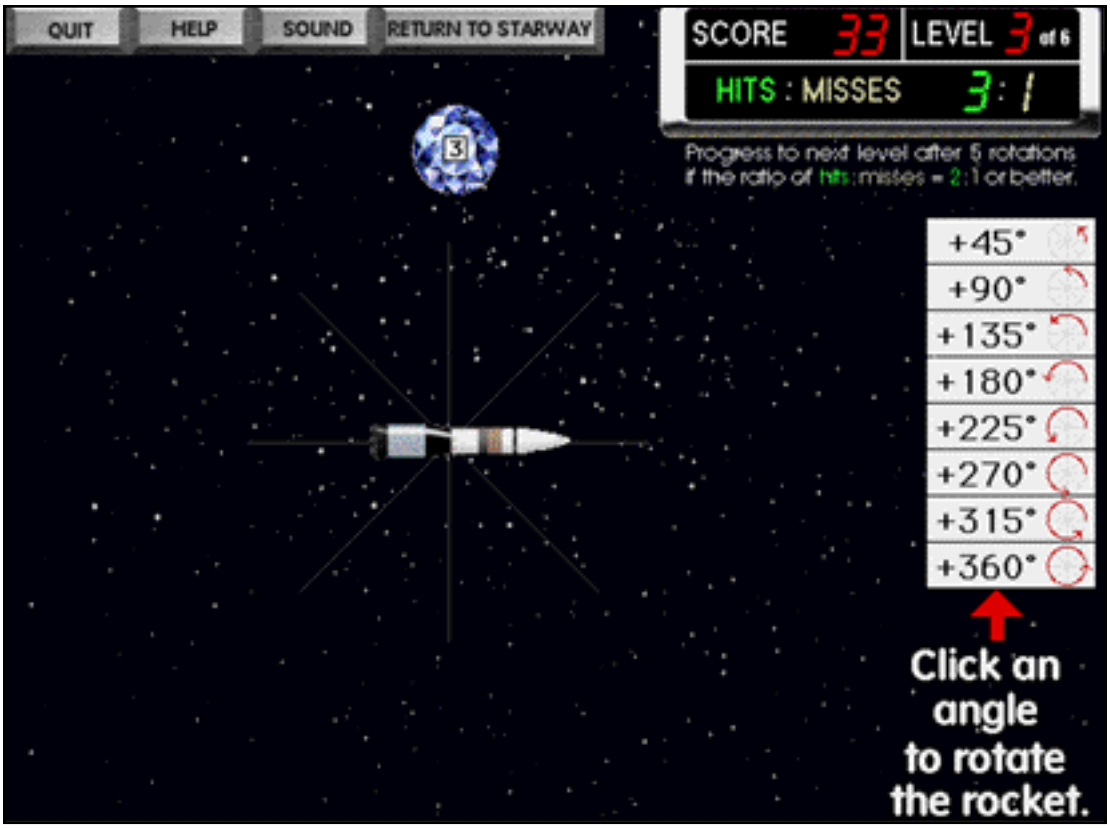
Description

You have two minutes to identify the rockets with numbers that are factors, multiples, composites or primes according to the instructions. Each correct choice results in a point added to your score.

The range of numbers in the first challenge is limited, but after that, the range of numbers increases to 100.

Context sensitive help is available by clicking the HELP button where definitions and examples of factors, multiples, composites and primes are presented.

Rocket Rotation



Math skills

- ★ Estimate the size of angles within a reasonable range
- ★ Sort polygons according to the number of lines of symmetry
- ★ Identify nets for a variety of polyhedra
- ★ Visualize the effects of rotations
- ★ Demonstrate an understanding of ratio

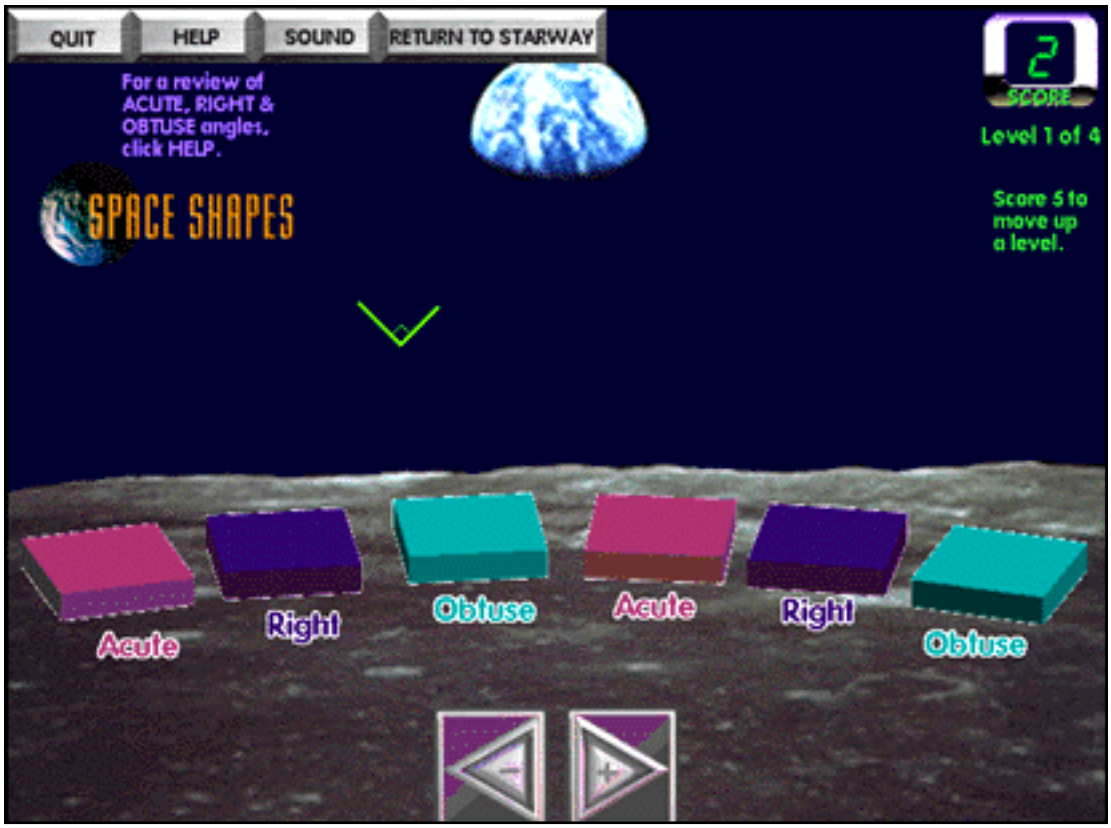
Description

Rotate the rocket so that it's exactly aiming at an object and your score will be increased by the object's value. Advance through each level after 5 rotations if your ratio of hits to misses is 2 to 1 or better.

You begin in Level 2 where your angle choices are limited to 90°, 180°, 270° and 360°. If Level 2 is too difficult, you'll be taken automatically to Level 1.

In Levels 3 and 4, the number of angle choices increases. In Level 5, the objects are polygons and the point values are related to the number of lines of symmetry. In Level 6, the most difficult level, the objects are 3-dimensional solids and their nets determine their point value.

Space Shapes



Math skills

- ★ Classify angles as acute, right and obtuse
- ★ Classify triangles according to angle and side properties
- ★ Classify quadrilaterals (trapezoid, parallelogram, rhombus)

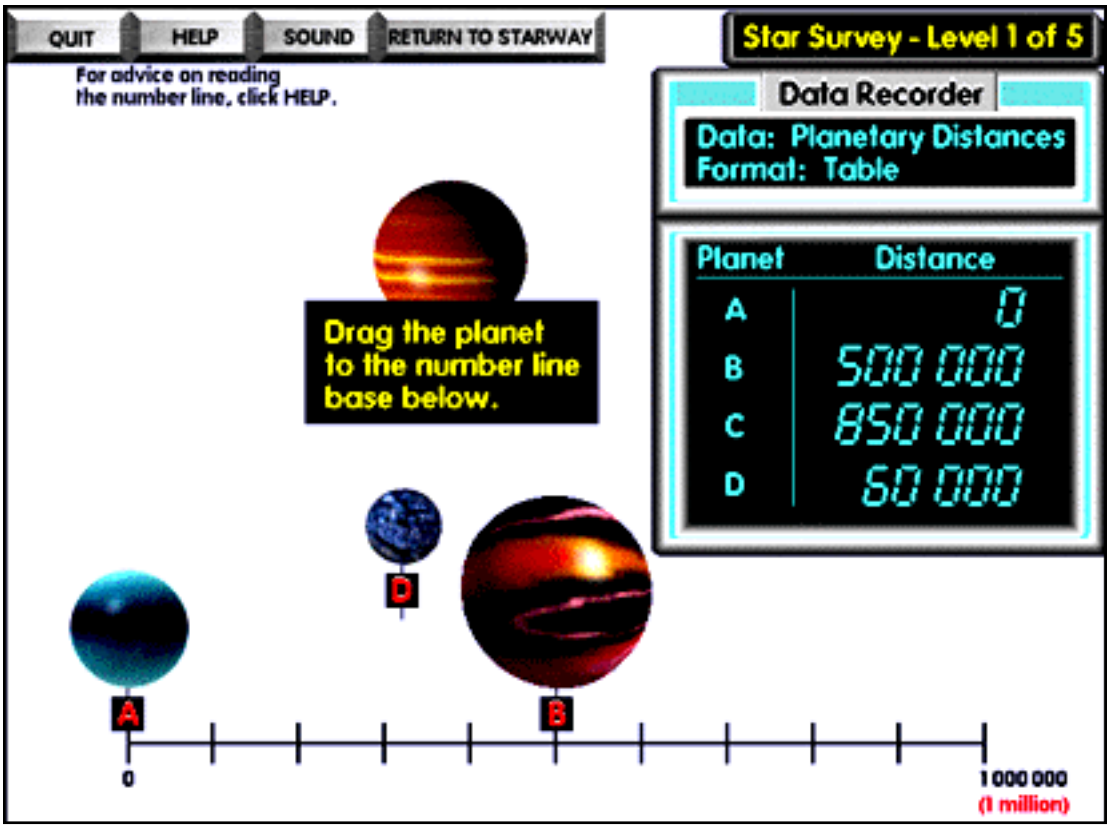
Description

Use the triangular – and + buttons at the bottom of the screen to guide falling angles or shapes to the proper collectors. In the example above, the falling angle is a right angle, so click the – button to move the angle directly over a collector labeled *Right*. When the right angle lands on a *Right* collector, you earn a point. Score 5 points to move up to the next level. Complete 4 levels to win a game.

If an item hits a non-matching collector, you lose the collector and all your points. To help you correct your mistake, the next item will fall more slowly and will be the same type as the item you misclassified. Missing all the collectors and hitting the ground may result in collateral damage.

Level 1 has right, acute and obtuse angles; level 2 has right, acute and obtuse triangles; Level 3 has scalene, isosceles and equilateral triangles; and Level 4 has trapezoid, parallelogram or rhombus collectors.

Star Survey



Math skills

- ★ Read and represent numbers from 0.001 to 999 999 999
- ★ Compare and order whole numbers and decimals
- ★ Relate fractions to decimals
- ★ Order fractions and decimals on a number line

Description

Visually represent the planetary distances data by dragging the planets to the number line. Correctly located planets stick to the line, while others bounce off. Advance to the next level by placing all four planets. Moving smoothly to Level 5 requires a good sense of the relative sizes of large numbers, decimals and fractions.

Levels 1 and 2 focus on large whole numbers (up to a billion in Level 2). In the example above, correctly placing Planet D means recognizing that 60 thousand is just slightly more than halfway between and 0 and the next marker (100 000).

In Levels 3, 4 and 5, the number line extends from 0 to 1, with markers at intervals of 1/10. The Level 3 distances are one, two, or three-digit decimal numbers; in Level 4, they're a mixture of common fractions with denominators of 2, 3, 4, 5, 10 or 100; and in Level 5, there's a mix of common fractions and decimals.

Troubleshooting – Macintosh

Problem	*Possible Cause*	*Possible Solution*
PERFORMANCE		
Nothing happens	• wrong **Starway** program	• For Power Macs, double-click **Starway - Power Mac** For all other Macs, double-click **Starway - Mac**
Program seems slow Program freezes	• not enough memory (at least 8 MB is required)	• Don't run other programs while running **Starway** • Turn OFF background printing • Close all windows in the Finder • Restart the computer
PRINTING		
Page doesn't print	• printer driver not installed or active • printer not properly connected • printer not selected under **Chooser**	• Refer to your printer and computer manuals
Printing is slow	• slow processor	• Don't use **Starway** while the printing is processing

Important notes:

- The program may behave oddly if the sound is turned off completely. Always have the sound on and adjust the volume level to your preference.
- Updates to the program, which may correct bugs or adjust for newer technologies, are available as free downloads from **www.mathville.com**

Troubleshooting – Windows

Problem	*Possible Cause*	*Possible Solution*
PERFORMANCE		
Nothing happens	• wrong **Starway** program	• For Windows 3.x, double-click **Star3.exe.** For Win 95 or higher, double-click the **Starway** icon
Program seems slow Program freezes	• not enough memory (at least 8 MB is required)	• Don't run other programs while running **Starway** • restart the computer
General Protection Fault error	• memory management error	• Exit Windows and restart the computer • Run SCANDISK to detect and fix any memory location errors
Display is acting odd (fading, etc.) Some text on the screen seems too large	• monitor display may be set incorrectly	• Through Windows Setup, set your display to Super VGA 640 x 480, 256 colors • Choose small fonts instead of large fonts in display set up
PRINTING		
Page doesn't print	• printer driver not installed or active • printer not properly connected • printer not selected under Print Manager	• Refer to your printer and Windows manuals
Printing is slow	• slow processor	• Don't use **Starway** while the printing is processing
Parts of page don't print	• incompatible driver	• Exit **Starway** and try again by double-clicking **Star3.exe**

Important notes:

- The program may behave oddly if the sound is turned off completely. Always have the sound on and adjust the volume level to your preference.
- Updates to the program, which may correct bugs or adjust for newer technologies, are available as free downloads from **www.mathville.com**

Teacher Notes

Metric Concentration

Suggested grade level: 5, 6 or 7

Corresponding software: *Mathville Starway, Metriconversion* activity

Curriculum expectations addressed:

Measurement:

* understand metric prefixes, units and symbols
* estimate, measure and record lengths
* calculate rectangular areas
* apply appropriate techniques, tools and formulas to determine measurements

Geometry:

* constructing tiling patterns (tessellations) to cover a plane

Prerequisites: Measuring activities with metric units, discussion and demonstrations of tessellations

Materials required: Copies of the following worksheet, cardboard or paper and metric rulers and tape measures

Suggestions for use: This can be done as a small group activity with groups of 2 to 5. Once the deck(s) have been created, the Concentration game may be played with pairs, small groups or as a solitaire game.

Variations and extensions:

1) Have students create new decks using metric **mass** units (g, kg, mg, etc.) and different tiling patterns. The number of cards and ALL the faces are to be determined by the students.

2) Create a deck using metric sports data (current world pole vault record, reigning Olympic men's 100 m dash champion, length of the race sometimes called the "metric" mile, distance that must be backstroked in the 400 m individual medley swimming event, etc.)

3) Have students experiment with the shapes of the cards: suggest M. C. Escher designs, alphabet shapes, more than one shape, etc.

4) Have students face new challenges and check the work of other groups at the same time by playing several rounds of Concentration with a deck created by **another** group.

Student Worksheet

Metric Concentration

Design a set of 20 cards:

The size, shape, and design on the backs of the cards is up to you, with **one condition**: when you lay out the cards, they must tile the plane (fit together without gaps or overlaps).

Write on the faces of 10 of the cards:

- The diameter of a penny in mm
- The radius of a CD-ROM in cm
- The length of a pencil in cm
- The length of a sheet of paper in cm
- The height of a student in cm
- The width of a classroom in m
- The perimeter of a classroom in m
- The area of a sheet of paper in square cm
- The area of a table top in square m
- The floor area of a classroom in square m

Create 10 matching cards by measuring the diameter of a penny, the radius of a CD-ROM, etc. and writing the measurement on a card face. Don't forget to include the unit names (mm, cm, etc.)

Use your deck to play a game of Metric Concentration:

a) Shuffle the deck and lay out the cards face down
b) Each player turns 2 cards face up. If the cards match, the player collects them; if not, they are turned face down.
c) Continue until all cards have been collected. The player with the most cards wins.

This is one of a set of math worksheets available from www.mathville.com.